UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/767,727	01/30/2004	Vittorio Accomazzi	14604	6086

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EXAMINER
RUSH, ERIC

ART UNIT	PAPER NUMBER
2609	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
Office Action Summary	10/767,727	ACCOMAZZI ET AL.
	Examiner	Art Unit	
	Eric Rush	2609	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 January 2004*.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 - 29* is/are pending in the application.

    4a) Of the above claim(s) *19 - 26 and 29* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 - 18 and 27 - 28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ ~~Claim(s) 1 - 29~~ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____ .

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date *5 August 2005*.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____ .

DETAILED ACTION

Election/Restrictions

1.   Restriction to one of the following inventions is required under 35 U.S.C. 121:

    I.   Claims 1 – 18, 27, and 28 are, drawn to a system and method for training

        models to classify pathology types, classified in class 382, subclass 128.

    II.   Claims 19 – 26, and 29 are, drawn to a system and method for classifying

        images of organs/anatomy into various disease categories, classified in

        class 382, subclass 215.

The inventions are distinct, each from the other because of the following reasons: .

2.   Inventions I and II are related as subcombinations disclosed as usable together

in a single combination. The subcombinations are distinct if they do not overlap in

scope and are not obvious variants, and if it is shown that at least one subcombination

is separately usable. In the instant case, subcombination II has separate utility such as

classifying and recognizing facial images and/or gazes. Subcombination I has separate

utility such as training a neural network to distinguish between different fruits and/or

good fruit from rotten fruit. See MPEP § 806.05(d).

    The examiner has required restriction between subcombinations usable together.

Where applicant elects a subcombination and claims thereto are subsequently found

allowable, any claim(s) depending from or otherwise requiring all the limitations of the

allowable subcombination will be examined for patentability in accordance with 37 CFR

1.104. See MPEP § 821.04(a). Applicant is advised that if any claim presented in a continuation or divisional application is anticipated by, or includes all the limitations of, a claim that is allowable in the present application, such claim may be subject to provisional statutory and/or nonstatutory double patenting rejections over the claims of the instant application.

3.   Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions require a different field of search (see MPEP § 808.02), restriction for examination purposes as indicated is proper.

4.   Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions have acquired a separate status in the art due to their recognized divergent subject matter, restriction for examination purposes as indicated is proper.

5.   Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper.

6.   During a telephone conversation with Mr. Ralph Dowell on June 19, 2007 a

provisional election was made with traverse to prosecute the invention of a system and

method for training models to classify pathology types, invention I, claims 1 – 18, 27,

and 28. Affirmation of this election must be made by applicant in replying to this Office

action. Claims 19 – 26 and 29 are withdrawn from further consideration by the

examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

7.   Applicant is reminded that upon the cancellation of claims to a non-elected

invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one

or more of the currently named inventors is no longer an inventor of at least one claim

remaining in the application. Any amendment of inventorship must be accompanied by

a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Rejections - 35 USC § 102

8.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9.   Claims 1- 6, 9, 11 – 13, 15 - 18 and 27 - 28 are rejected under 35 U.S.C. 102(b)

as being anticipated by Sheehan et al. U.S. Patent No. 6,106,466.

-     With regards to claim1, Sheehan et al. teach an image processing system having a statistical appearance model for interpreting a digital image, the appearance model having at least one model parameter, the system comprising: a multi-dimensional first model object including an associated first statistical relationship and configured for deforming to approximate a shape and texture of a multi-dimensional target object in the digital image, (Sheehan et al., Column 12, Lines 8 – 11, Column 14 Lines 27 - 52) and a multi-dimensional second model object including an associated second statistical relationship and configured for deforming to approximate the shape and texture of the target object in the digital image, (Sheehan et al., Column 15 Lines 65 – Column 16 Line 25) the second model object having a shape and texture configuration different from the first model object; (Sheehan et al., Column 15 Lines 65 – Column 16 Line 25) a search module for applying the first model object to the image for generating a multi-dimensional first output object approximating the shape and texture of the target object and calculating a first error between the first output object and the target object, (Sheehan et al. Column 16 Lines 50 – 64) and for applying the second model object to the image for generating a multi-dimensional second output object approximating the shape and texture of the target object and calculating a second error between the second output object and the target object; (Sheehan et al., Fig. 13, Column 16 Lines 50 – 64) a selection module for comparing the

first error with the second error such that one of the output objects with the

least significant error is selected; (Sheehan et al. Fig. 13 Elements 238 &

244, Column 17 Lines 20 – 22) and an output module for providing data

representing the selected output object to an output. (Sheehan et al. Fig. 1

Element 36, Column 17 Lines 41 – 48)

- With regards to claim 2, Sheehan et al. teach the system according to

claim 1; wherein the first model object is optimised for identifying a first

one of the target object (Sheehan et al., Column 12 Lines 8 – 23) and the

second model object is optimised for identifying a second one of the target

object, (Sheehan et al., Column 16 Lines 50 – 64) such that the second

target object having an shape and texture configuration different from the

first target object. (Sheehan et al., Column 16 Lines 50 – 64)

- With regards to claim 3, Sheehan et al. teach the system according to

claim 2 further comprising the digital image being one of a set of digital

images, (Sheehan et al. Column 11 Lines 29 – 24) wherein each of the

model objects are configured for being applied by the search module to

each of the digital images of the set. (Sheehan et al., Column 12 Lines 24

– 42)

-    With regards to claim 4, Sheehan et al. teach the system according to claim 3, further comprising the selection module configured for selecting one of the object models to represent all the images in the set. (Sheehan et al. Column 13, Lines 3 – 6)

-    With regards to claim 5, Sheehan et al. teach the system according to claim 1; wherein the output is selected from the group comprising an output file for storage in a memory and a user interface. (Sheehan et al. Fig. 2, Column 8 Lines 3 – 12 and Column 8 Line 61 – Column 9 Line 3)

-    With regards to claim 6, Sheehan et al. teach the system according to claim 2 further comprising a training module configured for having a set of training images including a plurality of training objects with different appearance configurations, (Sheehan et al., Column 12 Lines 8 - 33) the training module for training the appearance model to have a plurality of the model objects optimised for identifying valid ranges of the shape and texture of respective ones of the target object. (Sheehan et al. Column 13 Lines 55 – 65, Column 17 Lines5 – 13)

-    With regards to claim 9, Sheehan et al. the system according to claim 2, wherein the first and second model objects represent different appearance configurations of the same anatomy of two different two dimensional slices

taken from spaced apart locations of an image volume of the anatomy.
(Sheehan et al., Column 11 Lines 22 – 28, Column 15 Line 65 – Column
16 Line 25)

- With regards to claim 11, Sheehan et al. teach the system according to
claim 1 further comprising a predefined characteristic associated with the
model parameter of the selected model object, (Sheehan et al., Column
12 Lines 8 – 61) the predefined characteristic for aiding a diagnosis of a
patient having an anatomy represented by the selected output object.
(Sheehan et al. Column 17 Lines 41 – 48)

- With regards to claim 12, Sheehan et al. teach the system according to
claim 11, wherein the model parameter is partitioned in to a plurality of
value regions, (Sheehan et al., Column 13 Line 66 – Column 14 Line 26)
each of the regions assigned one of a plurality of the predefined
characteristics. (Sheehan et al. Column 13 Lines 56 – 65)

- With regards to claim 13, Sheehan et al. teach the system according to
claim 12, wherein the model parameter is selected from the group
comprising a shape and texture parameter (Sheehan et al. Column 14
Lines 38 – 52), a scale parameter and a rotation parameter. (Sheehan et
al., Column 14 Line 53 – Column 15 Line 10)

- With regards to claim 15, Sheehan et al. teach the system according to claim 12, wherein the output module provides to the output the predefined characteristic assigned to the selected output object. (Sheehan et al. Column 17 Lines 41 - 47)

- With regards to claim 16, Sheehan et al. teach the system according to claim 12 further comprising a training module configured for assigning the plurality of the predefined characteristics to the model parameter. (Sheehan et al. Column 12 Lines 43 – 61)

- With regards to claim 17, Sheehan et al. teach the system according to claim 15 further comprising a confirmation module for determining if the value of the model parameter assigned to the selected output object is within one of the partitioned regions. (Sheehan et al. Column 16 Lines 50 - 64)

- With regards to claim 18, Sheehan et al. teach the system according to claim 17, wherein the value of the model parameter when outside of all the partitioned value regions indicates the first output object is an invalid approximation of the target object. (Sheehan et al. Column 17 Lines 3 – 13)

- With regards to claim 27, Sheehan et al. teach a method for interpreting a digital image with a statistical appearance model, the appearance model having at least one model parameter, the method comprising the steps of: providing a multi-dimensional first model object including an associated first statistical relationship and configured for deforming to approximate a shape and texture of a multi-dimensional target object in the digital image; (Sheehan et al., Column 12, Lines 8 – 11, Column 14 Lines 27 - 52) providing a multi-dimensional second model object including an associated second statistical relationship and configured for deforming to approximate the shape and texture of the target object in the digital image, (Sheehan et al., Column 15 Lines 65 – Column 16 Line 25) the second model object having a shape and texture configuration different from the first model object; (Sheehan et al., Column 15 Lines 65 – Column 16 Line 25) applying the first model object to the image for generating a multi-dimensional first output object approximating the shape and texture of the target object; (Sheehan et al. Column 16 Lines 50 – 64) calculating a first error between the first output object and the target object; (Sheehan et al. Column 16 Lines 50 – 64) applying the second model object to the image for generating a multi-dimensional second output object approximating the shape and texture of the target object; (Sheehan et al., Fig. 13, Column 16 Lines 50 – 64) calculating a second error between the second output

object and the target object; (Sheehan et al., Fig. 13, Column 16 Lines 50

– 64) comparing the first error with the second error such that one of the

output objects with the least significant error is selected; (Sheehan et al.

Fig. 13 Elements 238 & 244, Column 17 Lines 20 – 22) and providing data

representing the selected output object to an output. (Sheehan et al. Fig. 1

Element 36, Column 17 Lines 41 – 48)

-        With regards to claim 28, Sheehan et al. teach a computer program

product for interpreting a digital image using a statistical appearance

model, the appearance model having at least one model parameter, the

computer program product comprising: a computer readable medium;

(Sheehan et al. Column 8 Lines 3 - 15, Column 8 Line 61 – Column 9

Line 10) an object module stored on the computer readable medium

configured for having a multi-dimensional first model object including an

associated first statistical relationship and configured for deforming to

approximate a shape and texture of a multi-dimensional I target object in

the digital image, (Sheehan et al., Column 12, Lines 8 – 11, Column 14

Lines 27 - 52) and a multi-dimensional second model object including an

associated second statistical relationship and configured for deforming to

approximate the shape and texture of the target object in the digital image;

(Sheehan et al., Column 15 Lines 65 – Column 16 Line 25) a search

module stored on the computer readable medium for applying the first

model object to the image for generating a multi-dimensional first output

object approximating the shape and texture of the target object and

calculating a first error between the first output object and the target

object, (Sheehan et al. Column 16 Lines 50 – 64) and for applying the

second model object to the image for generating a multi-dimensional

second output object approximating the shape and texture of the target

object and calculating a second error between the second output object

and the target object, (Sheehan et al., Fig. 13, Column 16 Lines 50 – 64)

the second model object having a shape and texture configuration

different from the first model object; (Sheehan et al., Column 15 Lines 65

– Column 16 Line 25) a selection module coupled to the search module

for comparing the first error with the second error such that one of the

output objects with the least significant error is selected; (Sheehan et al.

Fig. 13 Elements 238 & 244, Column 17 Lines 20 – 22) and an output

module coupled to the selection module for providing data representing

the selected output object to an output. (Sheehan et al. Fig. 1 Element 36,

Column 17 Lines 41 – 48)

Claim Rejections - 35 USC § 103

10.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains.
Patentability shall not be negatived by the manner in which the invention was made.

11.   The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

   1.   Determining the scope and contents of the prior art.
   2.   Ascertaining the differences between the prior art and the claims at issue.
   3.   Resolving the level of ordinary skill in the pertinent art.
   4.   Considering objective evidence present in the application indicating
         obviousness or nonobviousness.

12.   Claims 7 – 8, 10, and 14 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Sheehan et al. U.S. Patent No. 6,106,466 in view of Mitchell et al.

"Disease Characterization of Active Appearance Model Coefficients".

-      With regards to claim 7, Sheehan et al. teach the system according to

       claim 2. Sheehan et al. fail to teach wherein the appearance model is an

       active appearance model. Mitchell et al. teach wherein the appearance

       model is an active appearance model. (Mitchell et al., Section 1 Paragraph

       2 – Paragraph 3) It would have been obvious to one of ordinary skill in the

       art at the time of the invention to modify the system of Sheehan et al. with

       the teachings of Mitchell et al. This modification would have been

       prompted because Active appearance models allow for the expected size,

       shape, and appearance variations in objects of interest.

- With regards to claim 8, Sheehan et al. teach the system according to claim 2. Sheehan et al. fail to teach wherein the first and second model objects represent different pathology types of patient anatomy. Mitchell et al. teach wherein the first and second model objects represent different pathology types of anatomy. (Mitchell et al. Section 1.1) It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Sheehan et al. with the teachings of Mitchell et al. This modification would have been prompted because Sheehan et al. suggest using their invention for a "plurality of three-dimensional reconstructions of the left ventricles in a population of hearts exhibiting a wide variety of types and severity of heart disease..." (Sheehan et al. Column 12 Lines 8 – 23) This modification would allow for the user to more quickly diagnose patients accurately.

- With regards to claim 10, Sheehan et al. as modified teach the system wherein the two different pathology types are represented by two different training objects in a set of training images since the two different pathology types in the device of Mitchell et al. are represented by two different training objects in a set of training images. (Mitchell et al., Section 1.1 Paragraph 1 and Section 3 Paragraph 1)

- With regards to claim 14, Sheehan et al. teach the system according to claim 12. Sheehan et al. fail to teach wherein at least two of the predefined characteristics represent different pathology types of the anatomy. Mitchell et al. teach wherein at least two of the predefined characteristics represent different pathology types of the anatomy. (Mitchell et al. Section 1.1 Paragraph 1) It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Sheehan et al. with the teachings of Mitchell et al. This modification would have been prompted in order to allow for weights to be applied to these characteristics, which would therefore help a user more accurately diagnose patients quickly, accurately, and effectively with the aid of the systems.

Conclusion

13.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Fenster et al. U.S. Patent No. 6,111,983; which is directed to a method and system for a deformable shape classification model.

- Toyama et al. U.S. Patent No. 6,741,756; which is directed to a method and system for estimation of the orientation of an object using training data.

-       Chaney et al. U.S. Patent No. 5,926,568; which is directed to an image

object matching system and method using core analysis and deformable

shapes.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Eric Rush whose telephone number is (571) 270-3017.

The examiner can normally be reached on 7:30AM - 5:00PM (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Chris Kelley can be reached on (571) 272-7331. The fax phone number for

the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

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For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KENT CHANG
PRIMARY EXAMINER

ER